

## **reformation and the seven sins**

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Here comes a great new book on stupidity: *La formation de l'esprit scientifique*. We recognize the genius by this sign: that he is not satisfied to just designate that which cannot think, but that he arouses it and makes it alive. In the sciences, everything changes: it is the intelligent books that are difficult to write; we are not intelligent in the sciences at little cost, at the cost of literature or philosophy, at the cost of words. Because words take revenge.



An essay on dormant physics written by an alert physicist, this book is paradoxical from the point of view of physics: an instrument of precision cut with an axe. Able to move scientific concepts by an ångström, it moves philosophical notions in a centimetric area.<sup>1</sup> It assumes a repertoire of science that is exact, precise, carved out. It sends it back without, or almost without, touching it, speaking while departing from it, without it. At the same time, it speaks the language of pre-science: alchemy, astrology, amusing electricity... before which recedes the first, that of positivity. Leakage and backflow, which permit one to judge, by recurrence, that these two lexicons, the present and the absent, turn their back on one another, without correspondence. And since one speaks of the things themselves and of closed systems, the other does not speak about it: it speaks therefore of man him-

self and of his relation to the world.<sup>2</sup> Pre-science speaks of being in the world, of self-awareness or awareness of others. Physics, the science of the world, upon reaching maturity (its formation completed), leaves an archaic matrix. Physics kills this matrix. And this is something like a human science, an archaic discourse of man. A philosophy. In passing: how many obstacles or repudiated notions here belong to philosophy? How many times does it pass for pre-science? Or pre-science for philosophy? Let's try to speak of this old discourse. Thus emerges another language, another human science, archaic or new. To specify, it is not the new scientific mind speaking of the archaic; it is the new (?) human science (?) that speaks of the old. Positivity stays between parentheses for this subjective synthesis.

Hence come a few floating words. Three examples. At the *zero degree*, if I dare to say, Bachelard uses 'phenomenology,' which is in its proper place, given the above, even '*phénoménotechinque*.' These words signify nothing other than the discourse on the phenomenon, or again, the discourse held on or by the laboratory tools. Note that this is the literal or etymological sense. In the *bent degree*, 'psychoanalysis,' which hardly refers to Freud, and even then only from the outside, is used more like an "analysis of the psyche" in question: once again, the literal or etymological sense. This soul is religious, ethical, intellectual: the classical soul of the moralist, perhaps that of the confessor, probably that of the psychagogical professor-guide. We'll have to come back to the crucial degree of this bending. And finally, in a *normal degree*, 'formation.'

Formation is a good word for the epistemologist. Spirit (*esprit*) is a rather bad one, to be honest. Religious, when it is saintly or diabolical, a bit alchemical if it is drawn from wine or salt, medical of classic times when, in the plural, it attaches to animals, the positive or scientific spirit smells its alembic, or heresy. Without irony, the tradition brings it from far off: since the birth of the history of science and until recently, this discipline has been constantly perceived as the adventure of the human mind. The word is to be found everywhere, in Montucla, Fontenelle, Condorcet...Bachelard.<sup>3</sup> Formation, on the other hand, at once cuts through the whole classification of science and is everywhere pregnant with positivity. Hence the importance that Comte gives to the term. It stems from grammar, syntax and morphology: case formation, verbs, prepositions...It stems from logic, where the rules are laid down to filter well-formed expressions. From biology, where Comte drew from: puberty, passage toward and establishing of the physiological state of the adult. From embryology in particular. From geology: ground layer of such an

origin, of such a nature. The psychology of form. The constellation of socio-political or socio-cultural functions: tactics, military or militant, combat group, divisions, unions, classes, parties...in the sense of superstructures, liberal arts, institutions and laws. Finally, the educational meaning of the institution of children. The term is omnidisciplinary. All things considered, it refers to a construction, an architecture and a genesis. Either a spatial drawing, a plan, in the sense that we want, and a lapse of time. Hence the diligence of epistemologists and historians of science, whose major problem is to confront a system and a history, structures and a future, who have in mind a block universe of space-time. Who should therefore be relativists, but who support above all the biological nuance, since the introduction of the term formation by Comte. Its normative connotation, which gives the standard reading in a recurring fashion, contributes again to its election. That said, the great works are settled on it, and explore the formation of set theory, the concept of reflex, the scientific mind, etc...<sup>4</sup> Thus, the importance of this transversal definition resides in the fact that it can index the references of the philosopher speaking of science. Let the word be fixed on the scale, taken in a unidisciplinary sense, and all the discourse will be lateralized.<sup>5</sup> The Husserlian tradition of the *Krisis* privileges the geological layer, Piaget the institution of children, others social training. And Bachelard?

He uses the term to the normal degree. This means, for a change, in the complete semantic range. Normal, that is to say without lateralization. Thus, the book is obscurely guided by the said encyclopedic or interdisciplinary circulation. It begins, or almost does, with general knowledge and verbal obstacles: the pre-scientific language is poorly formed. We shall respond to the question of how it is formed. And it finishes precisely with a long chapter on the institution of children, on the failures of training at school: teaching produces the poorly formed. Between these two limits, we mark fairly well the biological heritage of Comte: beyond the three laws<sup>6</sup> of the three states, history, spirit, and soul of which one is, precisely, puerile, we get the idea that maturity is positive, that the positive age is the mature one; we cannot go back upstream of the established norm, where the unformed is unreadable by the formed norm (hence the change of language in order to be able to speak); one no longer needs one's parents: mature knowledge rejects theology and metaphysics, the gods and notions, Mercury and phlogiston, but above all man who is the occupation solely of pre-science. And since there exists, for Bachelard, a point of non-return, no one could see how to avoid something like an epigenesis in the history of science. How can *esprit* come to the young sciences?

We noted that there is a lacuna in the encyclopedic range with the term *formation*: it makes little sense in physics. A good word for the epistemologist, a rather bad one for a physicalist. Second reason for changing the language, when it comes to interpreting the prephysics, to speak grammar, logic, biology, the analysis of the psyche. *Preformed* physics has no physical meaning, it is *unformed*. It speaks about language, reason, life, the soul, society, the world and nature, but never of the only object of physics, namely a closed system. Yet, of closed systems in general, taken directly as object, will be born the theory of information for which all formation remains a thermal scandal, an epistemological paradox. Formation makes no sense in physics because physics shows us that it is physical non-sense. It is thus impossible to speak in a physical sense about formation in the physical sciences. Bachelard will therefore talk about pre-science in all the other languages. These other languages develop from this lacuna: it is the first secret of the book, that for which the language of his own science recedes. In this, and perhaps unknown by him, Bachelard is consistent. A closed system is not something that is formed, it is something that is reduced. History, when it introduces a closed system, shows less of a break (*une coupure*)<sup>7</sup> than a carving (*une découpe*). The invading formations of language and thought must stop.

Bachelard himself fills in this lacuna elsewhere in overabundance. But his successors, in that they do not speak from this known and assumed blind-spot, will take his language for granted and will leave the place for physics gaping. As of yet there are left, at least in France, only philosophers of the logico-mathematical sciences on one side, and of the biological and socio-political sciences on the other. It is enough, once again, to take a word very frequently employed by the epistemologists in its widest interdisciplinary range: the word *class*,<sup>8</sup> which is logico-grammatical, mathematical, biological, socio-political, and pedagogical, to watch unfold, newly gaping, the same void. The concrete object removed, idealism remains, well hidden, moreover, by a long discourse on the real. Our philosophical times are marked by the disappearance of the object.



We have varied on the term formation. Its semantic range is far from being exhausted when we followed a scale of the sciences. On the side of the institution of children, there remains, in the region of norms, the moral meaning. Reform. Is the famous epistemological break the outcome of another protest, or the same, if we think that Galileo was condemned by a counter-reform? The importance given

to the polemical turn commits us to this path. It is by the bending of the word psychoanalysis that the entire ethical heritage will impose itself. Quite frankly, there is not a word of psychoanalysis in *La Formation*. Just listen to the language it mobilizes: it connotes a morality. The content analysis is overwhelming: it is a *Treatise of the Reform*. Of the mind, heart, soul, body, academic world. Formation of the scientific mind, I am afraid that this means, in truth, reform of the soul desperate to reach the quintessential. Read carefully the advice of alchemic practice to the alchemists (*Formation*, transl. p. 57-58) and see whether the epistemologist's advice to physicists and chemists is not, perchance, the same?

Proof, on the spur of the moment. Bachelard announces, from the first chapter, that he is working toward the moralization of science (p. 32), through a catharsis of the impure (p. 29 and everywhere). The *rectification*, the well-known road to success, is at first only a correction, thought of in a provisional morality (p. 25). Hence the revelation of the diagnosis itself: *the mind forms itself through reforming itself* (p. 33), the first theorem of a book, where the last could very well be: *objective control is a reform* (p. 238). The ethics towards which the professor leans is of a high austerity: it reproves the world and the socialites, as understood by the monasteries and Port-Royal; the salons and the marquises, who faint before the thunder, have hot flashes in front of the electric machine, and who put their virtue at risk. It shuns frivolousness, it declares that amusing electricity exhibits cannot be but false, and it asks its disciples to enter into the cloister of the school or the laboratory (p. 41, 43). Be boring, like Coulomb (p. 38), and you'll be taken seriously among your peers who control you. Come, be sad and you will be philosophers (p. 146). Prepare for intellectual asceticism (p. 241), even heroism (p. 141). Beware of dangers, *a sagitta volante in die, a negotio perambulante in tenebris, ab incurs et daemonio meridiano*. Here they are, all at once: the instincts are the obstacles (p. 25), intellectual joy is sometimes dangerous (p. 64), like intimate satisfaction (p. 238, 242). No ecstatic states of the soul (p. 238). Hence the rule: the mind does not want to enjoy quietly (p. 245). I spoke of the demon, one must exorcise it (p. 49). I spoke of the night, here are the shadows of knowledge (p. 24). I will speak later of trade and of the arrow of Eros. Having begun with exorcism, the text ends with a manual for fraternal confession. The last chapter is impressive. Do not remain, without surveillance, in solitude (p. 239); let us admit to our intellectual faults, let us confess (p. 240), break up with pride and greed, murmur: "error, you are not an evil," since our intellectual mistakes are forgivable (p. 241), erring compromises (p. 238); we tolerated impurities (p. 247), we renounce (p. 246), we ask that our impurities be amended by a reprimand (p. 238); let us return to the beginning;

after incrimination (p. 24), here finally there is repentance (p. 24). The confessor will say: the more recent the fault, the more serious the sin (p. 160). The book is framed by the act of penance, structured, one could say, like the sacrament. For confirmation: the last page speaks about changing the heart of man (p. 247) and the first takes the Pauline accents of the texts on the shedding of the old man: in front of the mystery of the real, the soul has difficulties making itself ingenuous, the mind is very old, science makes it younger (p. 25). Needless to say, these authentic citations are drawn from a background of exceptional abundance.

To rejuvenate (*rajeunir*), as far as I know, is the opposite of formation, in the physiological sense. Hence reform, in the moral sense, as a return or recurrence to a pure form. But let's extend the biological metaphor for a moment, to see that it is indeed a metamorphosis, as when the old man casts off his skin. Training then is transformation. To rejuvenate, the text goes on, is to accept a sudden *mutation* that must contradict a past (p. 25). The well-made head must be remade. *It changes species... By spiritual revolutions...man becomes a mutant species, a species that needs to mutate, that suffers from not changing* (p. 26). Hence Bachelard's fascination with the Kafkaesque theme of coagulation, announced by a theory of the *deformation* of concepts (p. 69); hence the inverted themes of the variables being joined together, the mathematical coordination (p. 73), the cohesion and cement (p. 76), the semantic circle where language clots, hardens, seizes (p. 75-77).<sup>9</sup> There is metamorphosis, transubstantiation in the right direction toward a good form, that is, mutation toward coordination; and there is transubstantiation in the wrong direction, toward a bad form, if the speech coagulates. On the one hand, psychagogy, reform: the object instructs me, modifies me (p. 246), it properly arouses new organic functions (p. 247). Right in the middle of the page, Bachelard skims along the sacramental word,<sup>10</sup> and approximates it with *consubstantiation*. On the other hand, the announced picture, the expected beast, which slowly hardens near the stove, in its crab shell, the dunce, the unscientific species, the subjectivist species, whose immobility instructs eminently (p. 242). We did not miss the bestiary, of which our pre-science is abundant.



Reform (moral), mutation, metamorphosis or change in species (biological), the term break (*coupure*) is the *mathema* of discontinuity or of distinction. It happens, in fact, that we may spot, here and there, certain "dates" when the scientific language undergoes a sudden translation, of the sort after which no one speaks as be-

fore. Entire texts, by groups or sets, are thus composed in a dead language, whose deciphering is, downstream, a prehistoric, paleontological undertaking: the logic of Lullian art, for example, after arithmetical combinatorics, alchemy itself after Lavoisier. Then again, the gap can only be identified from a distance. Looked at closely, it is never so simple: Copernicus and Galileo *aristotelize* with ardour, as do thousands after them, within the realm of science proper, like Leibniz; and Jacques Cassini (the son), in the middle of the 18<sup>th</sup> century, long after Newton's victory, continues to produce vortex models. And I say nothing of the crucial example of revivals: look at the question of matter, atoms, and fire. Sure, the theory of the break is compatible with a normalized, that is to say idealized, history, which explains its mathematical reference. But I would rather that the theory were compatible with all histories. For the moment, let's leave history as well as science. What is at stake? Here we are dealing with the basic language that the scholar, the historian, the erudite can lean on, and by which they are most often possessed. Bachelard, we are showing, relies, perhaps unwittingly, on an ethics, roughly the ethics of the founders of the university, in which we find a blind jumble of positivist themes, Christian themes, and even more archaic themes based on doctrines of initiation, asceticism and austerity. What is at stake is the change in this basic discourse, not what it is talking about, but the very discourse. It is a question of substituting the moral (and, thus, political) vocabulary of the continual progress of the mind with the political lexicon of the combat won at once, at a predicted or just at a given moment, against an adversary to be destroyed; of substituting for the vocabulary of reform, that of revolution. This is the real issue of the discussion of the continuous and the discontinuous. The battle takes place behind history and behind science: what is at stake, is to decide *who* will finally be the master of knowledge or the owner of history. The adversary is no longer the demon of confusion, the gnoseological demon of affects or prejudices, it is the demon of empire and of appropriation. In the face of this fundamental struggle, at the forefront of the scene, science and history have nothing but the status of elective objects that are there to be seized, and which are worthy of being seized. They were, in fact, in someone's hands; the battle plays out for the change, or not, of hands. And so, neither history nor science can settle the debate. It is undecidable from within science or from within the history of science; it is never, as far as I can see, the stakes that decide the winner of a competition. Assuming that it is possible to analyze these 'objects'<sup>11</sup> directly, which is far from clear, one can bet a thousand to one that the result will remain silent about the alternative of continuity versus discontinuity. Working from dawn till dusk, one can rejoice in contrary and equivalent arguments. And finally, considering the fundamental clash, are we

really facing an alternative in its proper domain here? One is never careful enough when employing a sectorial or dichotomous lexicon: it is often less revolutionary than it might seem. There have been many breaks, between Greeks and barbarians, heretics and Orthodox, whites and blacks, elites and common folk...that, before doing it again, before operating the cleaver, one had better be wary that those speaking dead languages (or languages declared dead) are once again excluded by some elite. Look at how, even in Bachelard himself, vocabularies of moral reform and of scientific revolution coexist, of biological transformation and of genetic mutation; look at how, backed by a traditional ethical discourse, he will consider curious 'breaks': the casting off of the old man,<sup>12</sup> passage from species to species, solutions and absolutions, mutations, scholarly utopias. There are, yes indeed, languages that remain foreign to one another; there are also dictionaries.



But back to basic language. There was a time when the confessor and the penitent had manuals to read into the soul. Among them, we find some very ingenious ones, in the 17<sup>th</sup> century for example, compared to which our classical treaties of the passions are lacking in finesse and penetration. The less good ones offered tables with a view to this decipherment. The simplest and best known is the rubric of the deadly sins. If it is then true that the moral lexicon of fault and sin dominates, *La formation*, as a treatise on the reform of the soul, as a manual of scientific ethics well-suited for fraternal correction, must contain a similar list. Non-science is the place of the cardinal sins, it can be mapped through pride, avarice, lust, gluttony, and sloth. The evidence is once again overwhelming; so strong that the demonstration risks repeating the text, unnecessarily. The reader will complete it for himself.

Three special chapters are devoted to three of the five major vices. The *psychoanalysis of the realist* (VII) reprimands the miser, the *myth of digestion* (VIII) surprises the glutton in his sweet apathy, the *libido* (X) rummages the lustful. You will say: this corresponds to the three stages of psychoanalysis in a somewhat deranged order, anal, oral, genital, and these texts are induced by the teachings of Freud, not by conventional morality. The argument would be convincing if the sanction of pride and of sloth and the praise of wrath and of envy were not found dispersed all over a book dedicated to work and humility, without anything more than a circumstantial relation to the new psychology. Let us make this clear. Between the language of alchemists and salon physicians who claim to signify the

object, but who speak only of the affective subject, and the language of science reaching maturity, which signifies the object but owes this performance to a psychagogy, to a catharsis of understanding, to a gnoseology of the subject in the first person plural, between these two languages which are foreign to each other, Bachelard suggests a dictionary; this dictionary cannot catalogue the translation of the objects themselves: the question how one says phlogistic in chemistry has no meaning, and electricity has completely forgotten its yellow amber origin, just like nitrogen (*l'azote*) has forgotten the first and last letters of known alphabets. There remains the possibility of translating the subjective states, of saying how the scientific mind is formed as such. The dictionary then builds itself on the human sciences, and Bachelard chooses psychoanalysis, which shows his insightfulness at the time. Hence the venture: the dictionary, in turn, establishes itself on an archaic terrain with respect to the human sciences that have not yet reached maturity, on a pre-scientific soil in the region of the operating subject. Hence, it models itself on the old discourse of man, the old morality culture is impregnated with from one end to the other. *Mutatis mutandis*, Bachelard is confronted with the same adventure as the alchemists in the chemistry of the object: his lexicon is seized by the dominant language, his psychoanalysis returns to the state of alchemy, it veers toward moralizing initiation. It no longer translates anything, because the libido remains lust, sadism wrath, and anality avarice. This venture is ordinary: just as the soil has remained the same, the puritan ethics is always well suited to the psychoanalytic project and its practitioner is seen as a confessor. Instead of devoting himself to a psychoanalysis of the pre-sciences, Bachelard ends up treating the former as a one of them. The turn, moreover, is so general that it is significant: maybe in this case we stumbled on a truth. That said, here the dictionary is no longer a tool of passage between two foreign languages, the two basic languages being identical. It turns out that no gap whatsoever exists between Bachelard's psychoanalysis and pre-scientific morality. And the initiation to the scientific mind is indeed the same catharsis as the initiation of the alchemist: *quod erat demonstrandum*. The underlying semantic network, as elsewhere, coagulates, hardens, and seizes.

Quick checks: five variations, on the spur of the moment. Here is the realism and the joy of owning, a miserly joy and Harpagon complex (p. 136-137). Its fundamental axiom: nothing is lost, nothing is created, saying of the miser (p. 137). The dust of pearls attracts the miserly member of the middle class more than the prodigal prince (p. 142): by the way, who is the father, who is the son, a question of psychoanalysis or of politics? Precious stones, objects of diligence in archaic

knowledge, are concentrations of fortune, maximum value for minimum space: it is intelligent avarism (p. 142-143). It is necessary to have in order to give, but to give remains more difficult than to receive, postulate of the petty (p. 146). Let us finally break with these greedy states of the soul (p. 238, 241). The reader can glean even more: let a few ears (of corn) drop on purpose, he said.<sup>13</sup>

Second harvest in the fields of sin. The emerald is chaste (p. 140-141), a figure of purity omnipresent and often virginal. The lover is patient like a scholar (p. 185), hence the libido, insidious, ends up surfacing even in this heart of stone completely occupied with the aridities of the intellect (p. 186). Alchemy indulges, blindly, by proxy, in all fantastic manners, onanism (p. 188), incest (p. 189)...even jealousy, when its partisans beat their wives (p. 190). What turpitude! (*ibid.*). Never did a scientific treatise write such things. Thus, the whole chapter describes the exercise of lust, including the tired attempts of the old man to regenerate himself, this old man of whom we do not know whether he is Booz, David, or Saint Paul himself. Hence the conclusion: objective knowledge must be a *tranquil* knowledge; confused youth or Faustian old age are obstacles: *vade retro*. Alas, educators do not work to provide this tranquility! (p. 209).

Where to pick becomes where to peck, and then to devour. With the reign of science, gluttony has disappeared from the University: to be convinced, go seek a cookbook at the library of Dijon (p. 37); from you to me, we must find there even fewer arts of love. Do you want some recipes? They abound in non-science: take and mix some bread, mutton, lemon, spinach, watercress, honey, brandy (p. 74), you get a kind of gruel; soaking in a garlic juice, seasoning (p. 178) (by the way, the article of the *Encyclopedia* was not from the hand of Diderot). Taste and smell (p. 74)<sup>14</sup>, the electric current, for example, and decide if it is acrid, tangy, sweet, spicy...(p. 110-111). Digest with the ninth chapter: stomach and retort (how I did not know that the still has a cucurbit!), guts and excrement, we return to something like the realism of the greedy. Conclusion: it is necessary that the unconscious be *disturbed* to advise such uses, such follies (*vésanies*) (p. 183). How can the idea come about? See psychoanalysis turn to scandal. In Freud, coprophagia is explained, here it is *incredible* (p. 183). All of our meals are deodorized (p. 239), in the austere scientific banquet, where our peers banish inebriation: the enormous subjective success that is an inebriation would be the most unrectifiable of errors (p. 238). To dream of lost Greekness.

Let us together abandon pride (p. 240), the will of repressed power, anarchic and satanic tendencies, the need to be master of things in order to oppress people (p. 48); I have cited exorcism and conjuration, here is the Luciferian sin. The worst, because the temptation remains: to provoke the philosophers, to win over people by people in talkative reasoning, is a sweet success for the will of power, but to be right, to have reason on one's side by things putting us in the right, that is the immense success where the *luminous* will of reason triumphs (p. 244). Perhaps the worst<sup>15</sup> is committed to satisfy the narcissism too frequently induced by a literary culture (p. 26) that loves parades (p. 92-93). General knowledge, universality acquired too quickly, is the sign of a thought in a hurry to admire itself (p. 71). No sooner has it advanced one of these grandiose unification hypotheses than it makes a show of intellectual humility. But this humility, talkative and tardy, is a poor disguise for a primitive immodesty. The basis of a knowledge that is generalized beyond the possible contradiction by objects is pride (p. 95).

Science requires humble people, certainly, but most of all workers. It has no use for inert (p. 66), indolent (p. 245), lazy people (p. 73). The last chapter, where the ethical vocabulary increases to a maximum density, forms a hymn to work, but the whole book is practically this anyway. Hence some celebrations: of constant and sustained effort (p. 242, 245-247), stimulation (p. 238), fatigue (p. 239-241), activity (p. 242), difficulty (p. 243, 249), construction (p. 238) and will (p. 248). Non-science is a collection of lazy sophisms, science a coordination of worked out truths, rectified. Formation and reform: the more difficult a work is, the more educational it is. Come on, back to work, suffer, fight and die without murmuring, you will be a man (p. 249). Get rid of the body (p. 154); life spread everywhere is an obstacle (chapter VIII). Final stage: Kipling, or Vigny, or the *Stoa poikilè*, in short austerity. To dream of midday dances.

The list is finished. But it is summarized twice in the text itself. Moral initiation, or reform: one must purify one's soul, despise money and gold, practice austerity, self-denial, be patient, be at work *in a relentless (de manière acharnée), disembodied (décharnée) way*. Heretical and perverse, Faust calls the devil to satisfy his passions. This is the ethical program of alchemy (p. 57-58). Compare it now either to content analysis or the terminal program (p. 240-242), and the book closes on itself, in perfect coherence. At this point of fusion, where the scientist is the same as his ancestor, most likely lies the secret crucible of the *oeuvre* that was about to come: for the one who was *both* the physicist of the complexity worked, rectified, formed, transformed, formalized, *and* properly became an alchemist of the form-

less material imagination.



*La Formation* is a prehistory and, as such, something like a psychagogy. But the archeological journey is organized by a purgative ethic of knowledge. Bachelard announces a floating plan(e), whereas the book is fairly well organized, according to the old list of deadly sins. The learned soul, in its third state,<sup>16</sup> initiated to the longing for abstraction, rejuvenated (p. 25) by shedding the old man,<sup>17</sup> is a pure soul: humble, insensitive to money and precious stones, modest, sober and laborious. It has pronounced the three vows of the university clergy: poverty, chastity, obedience. Alone in front of its object, the learned soul is a beautiful soul. A little boring, to be honest, like Coulomb's science (p. 38).

You say, Bachelard did not go to the end of the list, which demonstrates a poor reading, a partial key. There remains envy and wrath. Response: the practice of positive science preciously preserved these residual vices as virtues, as its own virtues. The new priests still thunder like Jupiter at the top of the hierarchy; they delight in terror, are obsessed with degrees, and color their competition with the greenish yellow of jealousy. Bachelard's catharsis is incomplete: beautiful souls and wicked city. The scientific utopia has still not built its Thélème.<sup>18</sup> It does not seem like it even wants to. Why not?

The relation of the subject to the object that was, for centuries, the basis upon which science and theory of knowledge constructed their empire, was *formed*, not by nature, but by civilization, in a brutal mode. The original sin of destruction is at the origin and foundation of our knowledge. To take, to grasp—Western man is an intellectual predator. To know is to hunt, violate, have power over, destroy. Listen to the great commandments of this dawn of science. We only command nature by obeying it, make yourself its masters and possessors, the object is nothing but an obstacle, progress follows polemics, conflicts, problems are to be solved, dissolved, volatilized... Ongoing speech of the killing, that of analysis, in the literal sense. Wickedness at the root of knowledge, wrath, envy, as desired norms, as cardinal virtues. Listen to Bachelard himself, here and everywhere else. We know *against* previous knowledge, by destroying, overcoming the obstacle (p. 24-25), thoughts are aggressive, polemical, we think our phenomenon through criticizing the phenomenon of others, we keep toiling away (p. 30), the scientific spirit must be formed *against* nature (p. 33). This is what we hear, at the very beginning; the

same thing, as an echo, at the end. Following the confession of the sins of the pleasures, school utopia exasperates envy by accentuating the hierarchy. We reward the head of the class by giving him the joy of teaching the second, the second is the monitor of the third, etc... (p. 242); when we know that the teacher is a sadist and the student a masochist, that pedagogy is the relation of the weak to the strong and the field of revenge (p. 245, 246), we know that we have been living for a long time in Utopia, in this one at least. In short, you have to be right against someone (p. 242). Envy, wrath, the capital virtues of the *reactive* researcher. Knowledge is against: against nature, against its own knowledge, against the self and the past, against others one by one or collectively.

Our *rigorous* science teaches us this, without saying it, with words that we do not listen to. Everyone is shocked that knowledge is no longer wisdom: it never has been since its first *formation*, since the criminal act was its act of birth, in the shade of Jupiter's *flamines* and of the legionaries of Mars. Knowledge is allied with power, it is power in its very essence, not only since empires have recognized and stolen its might, but since it has established itself as knowledge at the *loci* of strategy, of conquest and of the empire. *And now, under penalty of death, we are forced to outline a more archaic prehistory than that of Bachelard, to purify the sources of science poisoned, from the beginning, by terror.* It is no longer a question of the fine list of capital sins, but of our collective survival in the face of capital punishment. The purity of the soul is child's play in face of this risk.

We dream of a Quirinus who would return, in part, the painting.<sup>19</sup> What would happen if the modest workers of proof, still and evermore reactive, and reactive by the nature of tests and proofs (*épreuves et preuves*), discovered all of a sudden the truth, incredible and naked: that the intimate motivation of research, that the key to discovery, that the possible disclosure of the true intuition, resided neither in competition, nor in the desire to dominate, but in rejoicing?

## NOTES

1. [Editorial note: an allusion to a passage close to the end of *Formation* (transl. Mary McAllester Jones, p. 239): “Landry said that it is an easy matter to move an object lying on a table by a centimetre; moving it by a millimetre requires the complex interplay of antagonist muscles and is much more tiring (...) However, moving an object (...) by a millimetre is not yet a scientific operation. Scientific operations start at the next decimal point. To move an object by a tenth of a millimetre you need a piece of apparatus...”]
2. Positivism is a physicalism. It judges science and pre-science in the court of the physical method. Hence the elimination of ideology or psychology, condemned or suppressed. Then physics changes, and its method reintroduces the observer. Immediately the positivist gap is filled. To see the theological and metaphysical eras from this restitution, the new physicist mind reads pre-science from the vantage point of psychology. But physicalism is invariant, and its lexicon (formation, mind...) is Comte’s terminology. We have changed all of that: nowadays, we think we are turning our backs on Comte, but we only turn our backs on physics, by privileging the logico-mathematical and socio-political spheres. The object is lost: this rigorously defines the new idealism. [Note by the author in the version of *Hermès II. L’interférence*, p. 204.]
3. The mind is the subject of science as well as its object. Thus the mind informs its own history, as it is informed by the latter. This finishes with Hegel. Positivism: the mind is the subject of science and the object its object. This finishes with Bachelard, and with his bipolar epistemology, rationalism and realism. Henceforth: the subject-object opposition disappears, to make room for the idea that intersubjectivity is the control of science, upstream control of its production, downstream of its achievements. Control or regulation. [Note by the author in the version of *Hermès II. L’interférence*, p. 205.]
4. [Editorial note: Serres is referring to respectively Jean Cavaillès, *Remarques sur la formation de la théorie abstraite des ensembles*. Paris: Hermann, 1938 and Georges Canguilhem, *La formation du concept de réflexe aux XVIIe et XVIIIe siècles*. Paris: PUF, 1955.]
5. This could be called the spontaneous science of the philosopher. [Note by the author in the version of *Hermès II. L’interférence*, p. 206.] [Editorial note: This is a reversal of a concept by Louis Althusser, namely what the latter called the spontaneous philosophy of the scientists. See Louis Althusser, *Philosophy and the Spontaneous Philosophy of the Scientists & Other Essays*. London/New York: Verso, 1990.]
6. [Editorial note : Here Serres refers to a triple tripartition Bachelard makes in the “Discours préliminaire” (Foreword): a partition of stages as periods in the history of thought, one of stages in terms of degrees of abstraction, and a partition between three types of ‘soul’ (âme) corresponding to those stages. Cf. *Formation of the scientific Mind*, p. 18-21.)]
7. [Editorial note: It is a remarkable fact that, throughout the text, Serres uses several times the althusserian term *coupure* rather than the expected bachelardian *rupture*. Whether or not this is done intentionally, the shift is not without significance, since it reflects the temporary re-launch of Bachelard’s endeavour by Althusser in the late sixties, followed by its premature burial. Since, moreover, ‘épistémologie’ had, by the same token, come to mean the very thing althusserians were practising, along with others like Canguilhem, this shift is in part symptomatic of the sceptical stance Serres has come to adopt towards epistemology.]
8. [Editorial note: Here, of course, Serres refers to Althusser and the althusserians.]
9. Claude Moussy, *Recherches sur Trephô et les verbes grecs signifiant nourrir*. Paris, Klincksiek, 1969.

[Note by the author.]

10. [Editorial note: viz., transubstantiation. In fact, the word ‘transubstantiation’ occurs just once in the whole book: p. 123 of the translation.]
11. [Editorial note: viz., science and history of science.]
12. [Editorial note: St. Paul, Letter to the Colossians, 3:9]
13. [Editorial note: This is reference to a passage from the Bible, namely in the book of Ruth, chapter II.]
14. [Editorial note: rather than p. 69 = p.76 of the translation, as indicated in Serres’ text.]
15. [Editorial note: “il” in Serres’ text (« Peut-être il est commis pour assuouvir le narcissisme... ») can, by virtue of the pejorative meaning in the context, only refer to “le pire,” “the worst,” in the previous sentence.]
16. [Editorial note: this refers to the third stage of the third partition referred to in note 6, i.e., to the third type of ‘soul.’]
17. [Editorial note: see note 12.]
18. [Editorial note: a fictitious esoteric order and abbey, invented by Rabelais in *Gargantua*, carrying the motto “Fais ce que voudras”: “Do as you please.”]
19. [Editorial note: Quirinus is the Roman god, who forms a *triad* with Mars and Jupiter, that embodies sovereignty, struggle and production. Throughout his work, Serres regularly refers to this *triad*, when it comes to his critique of the objectionable face of science and, more generally, of practices of dominance and violence.]